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ICOM IC-471A 70-cm Transceiver

Info-Tech M-44 AMTOR Converter

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As they say in the world of operating: This radio not only plays, it plays real good! To the UHF uninitiated who may think that two-way work on 432 MHz (70 cm) is like working with optics, the 25-W ICOM IC-471A multimode radio can dispel that misconception in a hurry. In fact, readers accustomed to all the operating amenities now expected in HF radios will not be displeased when they sit down in front of this little beauty.

ICOM IC-471A 70-cm All-Mode Transceiver, Serial No. 01051

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 430.0 ~ 450.0 MHz.	429.9985-449.9984 MHz.
Modes of operation: USB, LSB, FM, CW.	As specified.
kHz/turn of knob: Not specified.	USB/LSB/CW: 1.7 kHz, 50 kHz (switchable); FM: 50 kHz, 250 kHz (switchable).
Frequency display: 7 digit.	Light-blue fluorescent, ¼-in-high digits.
Frequency resolution: SSB, 10-Hz steps (automatic 100-Hz steps shift); FM, 5-kHz steps. 1-kHz steps with TUNING RATE switch pressed.	As specified.
RIT frequency coverage: ±9.9 kHz from displayed receive frequency.	As specified (0.5 kHz/turn).
Transmitter output power: SSB—25 W PEP. CW, FM—25 W (continuously adjustable from 1 W to max).	Power output: Max. 31 W on all modes.
Harmonic suppression: Better than 60 dB.	75 dB (see Fig. 1).
Spurious suppression: Better than 60 dB.	75 dB (see Fig. 1).
Third-order intermodulation distortion dynamic range: Not specified.	−28 dB (see Fig. 2).
Receiver sensitivity: CW/SSB—less than 0.3 μV for 10-dB signal + noise/noise; FM—less than 0.3 μV for 12-dB signal + noise + distortion/noise + distortion.	Noise floor (minimum discernible signal) (dBm): −137. Blocking dynamic range (dB): 104. Two-tone, 3rd-order intermodulation distortion dynamic range (dB): 76. Third-order intercept (dBm): −23. Receiver quieting (μV for 12-dB signal + noise + distortion/noise + distortion): 0.3 μV
Squelch sensitivity: CW/SSB—less than 1.0μV; FM—less than 0.3 μV.	Min. 0.16 μV; max. 0.54 μV.
Audio output power: More than 2.0 W.	2.0 W at 10% total harmonic distortion.
Color: Two-tone gray.	
Size (HWD): 4.3 × 11.2 × 10.8 in.	
Weight: 12.5 lb without optional internal power supply.	

It Works

To put this radio through its paces, two portable operations from an elevation of 3100 feet in the Catskill Mountains of New York were conducted: the UHF Contest (August) and the VHF Contest (September) of 1984. The latter provided fantastic tropo conditions, which permitted numerous DX SSB/CW contacts. Over 200 contacts were made in 50 different grid locator squares as far away as Georgia—enough to qualify for the VUCC award (getting the cards is a bit more difficult, however). I found no difference in convenience and performance when comparing the IC-471A with operating your typical HF radio. Probably one of the truest tests in contest operation is how close you can operate in frequency to a monster-station like W2SZ/1—line-of-sight distance. Conclusion: within 5 kHz, with some discomfort; within 10 kHz, no problem . . . not bad for RF alley. Several inquiries regarding SSB audio quality yielded not only reports that "it sounds great," but also that "it sounds clean"—a glowing tribute when put to the subjective test in the Golden Corridor of the UHF Northeast.

Operating Niceties

The typical dual VFO (A and B) is controlled by a single main tuning knob, which has the good "feel" that amateurs have come to expect of a quality radio. It has absolutely no backlash, thanks to ICOM's unique rotary encoder circuit, which eliminates dial gears. An easy-to-find SPLIT control to the right of the main tuning knob selects the desired relationship of the two VFOs. In the OFF position, one VFO does it all. Pushing the switch delegates one VFO for receive and the other for transmit. Pushing A/B alternately selects either VFO for tuning, while the A=B button instantly equates the frequency and mode. The VFO in use is displayed in red as VFO A or B. It's a very functional arrangement. In a contest situation, this permits operating two portions of the band almost simultaneously, alternating short CQs. It might lead a similarly equipped listener to think you had two radios!

Since stations calling are not always lucky enough to also own a '471A, the receiver incremental tuning (RIT) must be used on occasion to "tune 'em in." The offset increment is nicely shown on the right-hand side of the window, in slightly smaller numerals than the main frequency display. The letters RIT are also displayed to eliminate any possibility of confusion. I appreciated the fact that RIT control is not "dinky" as with some HF radios. Regardless of the position of the RIT control, the CLEAR button returns the setting to zero. It's a slow tuner, with one turn offsetting only 0.5 kHz.

The Tuning Rate Switch, TS, allows a quick QSY by changing the operating frequency readout to increments of 1 kHz on any

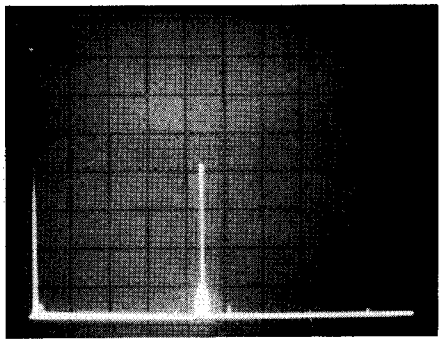

Fig. 1—Spectral display of the IC-471A. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 30 W at a frequency of 440 MHz. All spurious emissions are at least 75 dB below peak fundamental output. The fundamental has been reduced in amplitude approximately 38 dB by means of notch cavities; this prevents analyzer overload. The IC-471A complies with current FCC specifications for spectral purity.

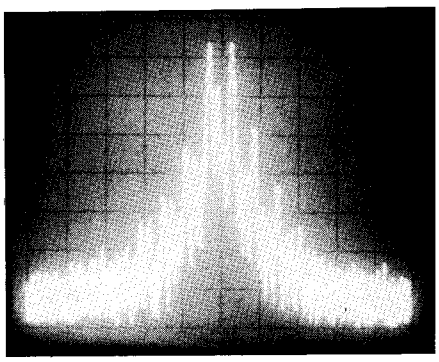

Fig. 2—Spectral display of the IC-471A output during transmitter two-tone IMD test. Third-order products are 28 dB below PEP, and fifth-order products are 42 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The IC-471A was being operated at rated input power on the 70-cm band.

mode, instead of 10 Hz. On FM, it permits tuning in signals that are off from the 5-kHz step frequencies. The UP DOWN switches allow 1-MHz jumps. On FM, the + or − DUPLEX button allows standard repeater operation, while the CHECK switch allows an instantaneous check of the repeater input frequency. The OFFSET-WRITE allows access to repeaters of any nonstandard frequency separation. The optional microphone has the UP/DOWN tune feature. Although the test model did not come with the optional mast-mounted preamplifier, the front panel has a switch to bring this feature on line, a nice listening feature for weak-signal work.

Wherefore Art Thou, Memory?

Bells and whistles have become a way of life in today's state-of-the-art radios. Not to be outdone, the IC-471A comes complete with 32 memories and a multipurpose scanning feature. It takes a bit of manual-in-hand study, but after a while one gets the hang of it. The user-programmable memory can store any of 32 different frequencies, as well as the mode, and duplex/simplex. The display indicates that MEM is in operation and gives the channel number. The memory channel is

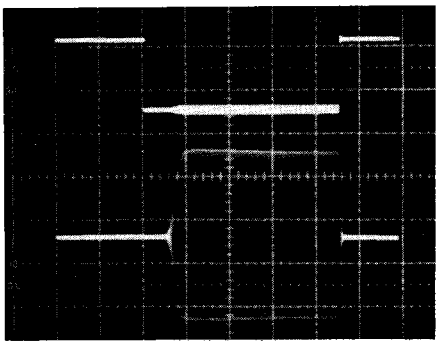

Fig. 3—CW keying waveform of the IC-471A. The upper trace is the actual key closure; the lower trace is the RF envelope. Each horizontal division is 5 ms.

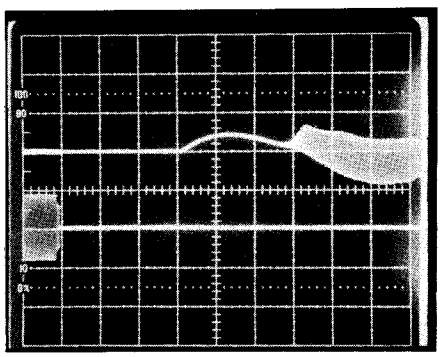

Fig. 4—Receiver recovery (turnaround) time. The lower trace shows the key opening; the upper trace shows receiver audio output. Horizontal divisions are each 20 ms. There is an approximate 120-ms delay before receiver recovery.

selected by the main tuning knob by use of the Dial Function Switch (DFS). Scanning can be programmed in a variety of ways: all programmed memory channels continuously; only channels having a desired operating mode; between two desired memory channels only; and automatic stop scanning in any mode.

Lightweight or Heavyweight?

The '471A is certainly a heavyweight when it comes to operating convenience and capabilities. Some of the features not already mentioned include VOX (semi-break-in on CW), CW side-tone monitor, CW delay control and subaudible tone encoder for FM operation. But it's a lightweight in terms of heft and compactness (that's good!), making it ideal for mobile and portable installation. It weighs a little over 12 pounds, perfect for mountaintop expeditions.

The End

Owners will have to bear with the sometimes difficult syntactic and typographical errors found in the manual. But this problem is minimal and will not lead to any real confusion in operating.

With the many operating activities sponsored on the VHF and UHF bands, 432-MHz capability is a must. For terrestrial propagation potential, some say the band is as good as 2 meters. With a few more radios like the IC-471A, 70 cm could indeed be as popular as 2 meters. You won't go wrong getting there with ICOM's IC-471A.

The IC-471A is available from ICOM America, Inc., P.O. Box C90029, Bellevue, WA 98009-9029, tel. 206-454-8155. Price class: IC-471A, $800; PS-30, $260; PS-25, $100; AG-1 preamplifier, $90; EX-310 voice synthesizer, $40.—*John Lindholm, W1XX*

INFO-TECH M-44 AMTOR CONVERTER

☐ If you've had a hankering to get on AMTOR, here's one way: Use an M-44, a terminal or teleprinter, and an SSB station. One advantage the M-44 has over other AMTOR converters is that it will work with Baudot or ASCII terminals; most other converters will work only with ASCII terminals.

The M-44 is housed in a black, 2-1/2 × 10 × 7-3/8-in-deep cabinet. Two toggle switches—POWER on/off and LIMiter on/off—and 10 LEDs are mounted on the front panel. Three LEDs are used for modem tuning: MARK, SPACE and PEAK. Other LEDs show: (1) the status of the PTT line (XMIT), (2) the status of the M-44 as an information sending station (ISS), (3) when synchronization is established (SYNC), (4) if an auxiliary transmit buffer is in use (AUX), (5) error status (ERROR), and (6) when the current buffer is full (FULL).

On the rear panel are five, 3-conductor, ¼-in jacks and a three-pronged, male, ac-line connector; the line cord is detachable. The five jacks are identified only by the numbers 1-5; you have to refer to the instruction manual to discover the function of each.

Inside the cabinet, a single, glass-epoxy, double-sided PC board holds the majority of components. A smaller single-sided board supports the two front-panel switches and the LEDs, and is mounted vertically behind the front panel. The power-supply protection fuse is clip-mounted on the main PC board.

The Manual

An abbreviated description of general AMTOR operation is presented. There's a list of amateur transceivers known to work on AMTOR, too. But remember, this list is not necessarily complete. Hook-up instructions, parts-placement and schematic diagrams, as well as detailed operating procedures are included.

Operation

At first glance, I noticed a few differences between the M-44 and other AMTOR converters I had used before. Missing were most of the status indicators that tell you about the condition of the link. Also, there is the tuning indicator that consists only of three LEDs. I thought it would be a poor indicator, but it turned out that my concern was unnecessary—it's more than adequate for AMTOR operation.

Commands

When power is applied to the M-44, nothing spectacular happens. In fact, absolutely nothing happens! It would be better if the M-44 sent a sign-on message to the terminal to let you know it was functioning properly. If nothing else, the sign-on message lets you know that everything is connected properly between the M-44 and the terminal.

Once the terminal/M-44 connections have been made, it's time to send some commands to the converter. All commands to the '44

must begin with a double slash (//) followed by one or more characters. Using a method such as this has its advantages and disadvantages. The only obvious disadvantage is that the M-44 will not let you send multiple slashes over the radio channel. If you send five slashes at your terminal, the person on the receiving end will not get all five slashes. On the other hand, there are several advantages to using a command structure such as this instead of using control or escape sequences. The first is that it will work equally well for ASCII or Baudot terminals. Also, almost all terminal emulation programs for home computers can generate the slash character. Very few terminal emulation programs can generate all control and escape sequences. AMTOR equipment that requires escape/control sequences has caused a lot of frustration for operators whose terminal programs couldn't generate those sequences.

Signal Tuning

When tuning a signal, the idea is to get the PEAK LED to stay on continuously while the MARK and SPACE LEDs flash with the incoming data. When I first saw this described in the manual, I thought it was really going to be a disaster! I was pleased to find, however, that this tuning display works very well.

Mode-Bc Master

To begin a transmission using mode Bc (FEC), you type //F. The M-44 always sends 40 idle characters to ensure that receiving stations have enough time to synchronize to the transmitter. Forty idles is significantly more than the four suggested by the international standard (CCIR 476-3). This long preamble can get in the way when you try to operate a net on mode B. Following the //F command, any characters typed at the sending terminal will be transmitted in the mode B format. Additionally, after each carriage return/line feed combination, the M-44 inserts a short idle period so other stations can synchronize to the transmitting station in the middle of a transmission. This idle-insertion feature should be included in all AMTOR equipment. To complete the transmission, use //Q.

Mode-A Master

To make a mode-A call, enter the mode-A command followed by the SELCAL of the station with which you want to communicate. For example, //AWWAW would start the '44 calling a station that was using the SELCAL WWAW. To allow the other station to transmit data, send the M-44's "over" sequence ("?). To break into the sending station's transmission, enter the break command—a double slash followed by a space character.

Mode-A Slave

Before someone can call your station using mode A, you have to tell the M-44 what characters you want to use for a SELCAL. Do this by giving the IDENTification command. For example, //IABCD tells the M-44 that it should use ABCD for its SELCAL. When it hears that combination, it will switch from standby to mode A and respond.

Mode-Bc Slave and Mode L

The M-44 is unique. When in standby, it can monitor either mode-B or mode-A transmissions without operator intervention. This is a handy feature, especially for those who like to monitor all the traffic on a frequency instead of copying traffic using only a certain mode.

Unlike many other AMTOR units, the M-44 does not print SELCALs when a station is making a call. This omission is disconcerting.

Bottom Line

The Info-Tech M-44 AMTOR modem should meet the needs of the casual AMTOR user. It is simple to connect to a radio and terminal. Unlike some other units, the M-44's designers took care to ensure that ac-line EMI filtering is provided to help reduce the problem of interference to radio equipment. Discriminating users might want to consider the "multiple-slash-character" limitation and the missing full set of status indicators. The M-44 is available from Digital Electronic Systems, Inc., 1633 Wisteria Court, Englewood, FL 33533, tel. 813-474-9518. Price class: $300.—*Paul Newland, AD7I* QST

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment "off-the-shelf" from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns.—Ed.]

The following ARRL-purchased Product Review equipment is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before August 27. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

Please clearly identify the item you wish to bid on, using the manufacturer's name, model number or other identification number if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail of the successful bid. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send your bids to Kathy McGrath, Product Bids, ARRL, 225 Main St., Newington, CT 06111.

Info-Tech M107 RTTY modem. Min. bid $130.

MFJ 1224 RTTY modem. Min. bid $67.

Mirage Communications B215 2-meter amplifier, s/n 280-684. Min. bid $167.

TEN-TEC Century/22 CW transceiver, s/n 579-0004, Model 979 power supply (as a package only—see May 1985 *QST*). Min. bid $233.

Macrotronics RM1000/RM200 modem (with software for Apple computer, s/n 2566. Min. bid $100.

Amateur Radio Software

Kantronics AMTOR 64, s/n 36192. Min. bid $47.

AEA-Soft AMTORTEXT-64, s/n 12. Min. bid $47.

New Products

COAXIAL CABLE WEATHER BOOTS

☐ An assortment of new flexible weather boots for use with BNC and F-type coaxial connectors is being offered by Kilo-Tec. Made of a flexible vinyl material that resists moisture and breakdown from the sun's rays, these boots are designed to keep connections clean and dry. Simply slip the weather boot over the cable before soldering on the connector, then slide the boot over the connector for a good weather seal.

The new boot models pictured are (l-r): Model KTBNC-59 for (F) BNC/RG-59 and RG-8X; Model KTBF-59 for (M) Type F/RG-59 and RG-8X; and Model KTBNC-58 for (F) BNC/RG-58. In addition, several models are provided for use with PL-259 and Type-N connectors, with boots for TNC connectors available on special order.

The boots are available at parts suppliers or direct from Kilo-Tec, P.O. Box 1001, Oak View, CA 93022, tel. 805-646-9645. Kit of six boots, your choice of type, $8.95 postpaid (California residents add 6% sales tax).—*Bruce O. Williams, WA6IVC*